A TENTATIVE CLASSIFICATION OF AND A KEY TO THE NORTH AMERICAN GENERA OF THE FAMILY BYRRHIDAE (NEW SENSE) AND FAMILY SYNCALYPTIDAE (NEW STATUS)

(COLEOPTERA, POLYPHAGA, BYRRHOIDEA)

By Aly Aly El Moursy[1, 2]

INTRODUCTION

The present account is a synopsis of a revision of the North American representatives of the family Byrrhidae (*auctorum*). This study, suggested by George E. Ball, was begun over a year ago at the University of Alberta.[3] A detailed illustrated monograph will be prepared for publication in the near future.

The following key may be used to distinguish between the two families discussed in this paper:

1. Prosternum V-shaped; eyes not visible in front view; antennae clavate, the club formed abruptly by enlargement of terminal three articles----------SYNCALYPTIDAE
   Prosternum T-shaped; eyes visible in front view; antennae various, if clavate, then club formed by gradual enlargement of the last six or seven articles----------BYRRHIDAE

Byrrhidae Leach, 1815

Description.—Body form oval, convex, minute to moderate in size; smallest individuals are found in the genus *Exomella,* the largest in *Byrrhus.* Integument either glabrous or covered with clavate bristles, erect hairs, or with a dense coat of decumbent hairs, giving to the integument a velvety appearance. Color gray, dark brown or black, or integument green or castaneous with a pronounced luster.

Head deflexed, convex. Eyes oval or slightly emarginate, situated on sides and partly hidden when head is retracted into prothorax. Labrum usually notched. Antenna of 11 articles, usually clavate, with club formed by gradual enlargement of fifth or sixth to eleventh article, or filiform or subfiliform. Mandibles with a variable number of teeth, variously arranged, with a deep notch at middle, provided with a leathery lobe. Maxillary palpus of three articles; labial palpus of two articles, terminal article pear-shaped or hatchet-shaped.

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[1] Department of Entomology, University of Alberta, Edmonton, Canada.
[2] Present address—Department of Entomology, Faculty of Science, University of Cairo, Egypt, U.A.R.

[3] The manuscript of the paper was reviewed by me, at the author's request, and some changes were made in it. Dr. El Moursy's period of study in Canada was interrupted by the steadfast refusal of the government of the United Arab Republic to grant to the author a temporary deferment from military service.—G. E. Ball.

Pronotum convex; prosternum T-shaped, broad anteriorly between coxae, received posteriorly into an emargination of mesosternum; anterior coxal cavities broadly open behind. Mesosternum short, broad in front, narrow behind. Metasternum much broader and longer than pro- and mesosternum, usually with a median longitudinal suture. Legs with anterior coxae transverse, separate; middle coxae less transverse, flat, separate; hind coxae usually transverse, nearly contiguous in mid-line, nearly attaining elytral epipleura laterally; trochanters triangular, large; femora of average length and proportions, usually somewhat flattened; tibiae slender or stout, usually flattened and expanded apically, densely covered with hairs or spines; tarsal formula 5-5-5, tarsomeres usually ascendingly larger from first to third article, fourth small, fifth long, third sometimes lobate, remaining articles with pubescent pads beneath; claws simple. Elytra covering abdomen dorsally, strongly convex, surface finely or coarsely punctate, or smooth; epipleural fold variously formed, extending to end of elytron, or usually shorter. Metathoracic wings of normal proportions or atrophied.

Abdomen with five sterna normally exposed, these punctate, glabrous or hairy. Male genitalia of the trilobed type; median lobe with apex flattened, pointed or hook-shaped, and short basal struts; lateral lobes well developed, contiguous basally; basal piece more or less triangular. Retractile plates of female symmetrical, with well developed styli on coxites.

Ecology and habits.—Byrrhids are herbivorous insects living on moist soil or dry sand, in moss, or under stones and logs. Some species are known to injure young trees in forest nurseries or plantations, some eat roots of wild grasses, weeds, oats and clover. A species of *Amphicyrta* has been reported as damaging various vegetables, and more especially, lilies (Doucette, 1953).

When disturbed, these beetles are able to retract their appendages and remain motionless for some time. When a byrrhid does this, it appears to be nothing more than a small pebble, or ball—hence the common name "pill beetle."

Classification.—The Leng Catalogue (1920) lists 72 species of Byrrhidae in 14 genera for America north of Mexico. As a result of a study of byrrhid material and examination of the type specimens,[4] I have concluded that eight of the species belonging to two genera should be removed from the family Byrrhidae and placed in a group of their own. Of the remaining 64 names, 31 must be listed as synonyms. Following is a summary of my classification.

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Byrrhinae

Total length 3.0-9.0 mm.; body oblong, oval, rounded or elongate; antennae clavate; integument with or without clavate hairs; legs in repose closely retracted into grooves in undersurface; elytra with or without striae; metathoracic wings normally developed or atrophied.

Simplocarini

Length 3.0-4.0 mm.; body elongate, light brown to dark brown in color; elytra shining, very weakly sculptured, with fine, feebly impressed striae.

Simplocaria Stephens, 1830

Morychini, New Tribe

Length 4.0-6.0 mm.; integument covered with fine, erect or decumbent, hairs; elytra not striate; crural depressions of abdomen small.

Morychus Erichson, 1847

Tylicus Casey, 1912

Pedilophorini

Body narrowed strongly from middle to elytral apex; abdomen densely and coarsely punctate beneath, with crural depressions occupying greater part of first visible abdominal sternum; elytra not striate; metathoracic wings atrophied.

Listemus Casey, 1912

Eusomalia Casey, 1912

Byrrhini

Length 4.0-9.0 mm.; body strongly convex, almost hemispherical; integument with or without clavate bristles; elytra striate.

Cytilus Erichson, 1847

Byrrhus Linnaeus, 1767

Porcinolus Mulsant, 1869

Amphicyrtinae

Total length 1.0-9.0 mm.; antennae filiform, subfiliform, or clavate; underside usually without grooves for reception of legs, when present, not well developed; elytra usually finely punctate, epipleura long or short.

Amphicyrtini

Length 5.0-9.0 mm.; color light brown to almost black, with or without a strong metallic luster; antennae filiform or subfiliform, not hidden

in repose on underside of body, hind coxae long, almost contiguous in mid-line, and almost reaching epipleura laterally; tibiae long and slender; third tarsomere bilobed; elytra finely punctate, not striate.

Amphicyrta Erichson, 1843

Lioonini

Length about 3.0 mm.; body elongate or globular; metasternum narrow; hind coxae globular, widely separated, not extending almost to epipleura laterally; third tarsomere not bilobed; elytra finely punctate.

Lioligus Casey, 1912

Lioon Casey, 1912

Exomellini

Length about 3.0 mm.; pronotum convex, rest of body forming another convexity; integument covered with long, curved hairs; mesosternum very narrow, occupied wholly by a deep transverse pit which receives obtuse apex of prosternal process; legs closely retractile, hind coxae slightly separated from one another; elytra with deep punctures arranged in longitudinal rows; epipleura of elytra broad anteriorly, narrowed posteriorly and disappearing near middle of body.

Exomella Casey, 1914

KEY TO THE GENERA OF NORTH AMERICAN BYRRHIDAE

1. Elytra striate ---------- 2
   Elytra not striate ---------- 6
2(1). Crural depressions of abdomen (grooves in first visible abdominal sternum for reception of hind femora) large, occupying more than half the first sternum---------- 3
   Crural depressions of abdomen small, occupying less than half the first sternum ----- 4
3(2). Integument with clavate hairs (one species from northeastern and central United States and the adjacent portion of Canada)---------- PORCINOLUS
   Integument with simple hairs (six species whose aggregate range in North America includes Alaska, all of Canada, and northern United States)---------- BYRRHUS
4(2). Epipleura of elytra broad, integument with curved hairs; length about 1.0 mm.; hind wings atrophied (one species from British Columbia)---------- EXOMELLA
   Elytral epipleura narrow, integument with simple hairs; length more than 3.0 mm., hind wings normal ---------- 5
5(4). Tibia with a row of spines on external margin (one, possibly two, species whose range includes southern Canada and northern United States, with extensions southward along the Rocky Mountains)---------- CYTILUS
   Tibia without spines on external margin (three species whose aggregate range includes Alaska, all of Canada, and montane areas in United States)---------- SIMPLOCARIA
6(1). Crural depressions of abdomen large, body narrowing strongly from middle toward apex of elytra ---------- 7
   Crural depressions of abdomen small or absent, body narrowing gradually toward apex of elytra ---------- 8
7(6). Elytra appearing vittate, punctures denser and larger in alternate rows (one species from Idaho and British Columbia)---------- EUSOMALIA
   Punctures on elytra not arranged to form vittae (two species from Alaska and northern California) ---------- LISTEMUS
8(6). Elytral epipleuron unusually broad, extending to extremity of elytron, narrowing gradually toward apex (two species, from Alaska, British Columbia, and California)---- LIOON

Elytral epipleuron narrower, about two-thirds the length of elytron---------- 9

9(8). Tibia with outer face convex, not grooved for reception of tarsus; hind coxa without a lateral grooved portion for reception of hind femur (three species from Alaska, British Columbia and Idaho)----------LIOLIGUS

Tibia with outer face grooved for reception of tarsus; hind coxa with a lateral extension with a deep depression for reception of hind femur---------- 10

10(9). Dorsal integument glabrous, punctate; antennae filiform; hind wings atrophied (three species from California and western Nevada)----------AMPHICYRTA

Dorsal integument covered with long hair; antennae clavate or moniliform; hind wings normal ---------- 11

11(10). Body with green or aeneous luster; middle tibia about as broad as middle femur (seven species whose aggregate range includes central Canada and all of United States but the southeast) ----------MORYCHUS

Body black, without metallic luster; middle tibia slender, about half the width of middle femur (two species from northern Michigan, Alberta and British Columbia) ---------- TYLICUS

Syncalyptidae Portevin, 1931 (NEW STATUS)

The genera *Syncalypta* Stephens, 1830 and *Curimopsis* Ganglbauer, 1902 have always been included in the Byrrhidae (see, for example, Dalla Torre, 1911; Erichson, 1843; Ganglbauer, 1904; Jacquelin du Val, 1857; Lacordaire, 1854; LeConte, 1862; LeConte and Horn, 1883; Reitter, 1882 and 1911; and Leng, 1920). Portevin (1931) put these two genera in a separate tribe, the Syncalyptini. Crowson (1955), however, recognized that the systematic position of this group was questionable, and he stated that the larvae of *Syncalypta* should be found and studied to determine if this group really belonged in the Byrrhidae. It seems to me that these genera and the Australian *Microchaetes* Hope, 1834 differ in so many characters from the typical Byrrhidae that the few superficial similarities may be ascribed to convergence. Therefore, I propose that the Syncalyptini, including *Microchaetes,* be elevated to the rank of family.

Description.—Size small to minute; body with scales or clavate hairs of various shapes.

Head deflexed, convex in front, curved laterally; eyes on sides of head, completely concealed when latter is retracted. Antennae of 11 articles, the last three progressively larger, forming together an abrupt club.

Prothorax convex, attenuate anteriorly; prosternum V-shaped; tarsal formula 4-4-4 or 5-5-5.

Abdomen with five visible sterna, broad at base, strongly narrowing from second sternum, first sternum broadly grooved to receive hind legs in repose. Male genitalia with basal piece cylindrical, median lobe long and curved; lateral lobes lacking. Retractile plates of female symmetrical with long, hairy styli.

The characters shared by the Byrrhidae and Syncalyptidae are: grooves on underside of body for the reception of the legs on contraction, and the possession of clavate hairs. However, the clavate hairs which occur in the Palaearctic *Curimus* and the Holarctic *Porcinolus* are simple, and are arranged in alternate light and dense rows, while those of the Syncalyptidae have different shapes and are scattered all over the body, sometimes arranged in clusters carried on elevated portions of the elytra.

The genera which are presently included in this family may be distinguished as follows:

KEY TO THE GENERA OF THE FAMILY SYNCALYPTIDAE

1. Tarsal formula 5-5-5, clavate hairs with longitudinal ridges, those on elytra borne on projections; length of body about 4.0 mm. (seven species, from Australia) ---------- MICROCHAETES

   Tarsal formula 4-4-4, clavate hairs of elytra not on projections---------- 2

2(1). Frons without two oblique grooves; integument with scales of various forms, and clavate hairs of various shapes; length 2.0-3.0 mm. (a Holarctic genus, in North America represented by eight species, ranging throughout United States, and northward to central Alaska)----------CURIMOPSIS

   Frons with two oblique grooves; integument without scales, but with simple clavate hairs; length about 1.2 mm. (a Holarctic genus, represented in North America by a single species, which ranges throughout Canada and probably northern United States) ---------- SYNCALYPTA

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REVIEW

A MANUAL OF COMMON BEETLES OF EASTERN NORTH AMERICA, *by* ELIZABETH S. and LAWRENCE S. DILLON. Row, Peterson and Co., Evanston, 884 pp., clothbound, $9.25.

It takes a long time to write a book; but it takes even longer to decide what is to be included in a book and what is to be left out. Those of us who have known of the Dillon and Dillon book have wondered just what would be left out. The advanced student of beetles is well aware of the tremendous task tackled by the Dillons. He knows that the word "common" must be used with extreme care. So it is no surprise that our ears pick up faint sounds from across the country as the mails are opened and exclamations of "at last" are heard. Those of you who have not yet seen the book can relax. The Dillons have accomplished what they set out to do. In fact, they have exceeded their original goal by this production, and have given us a carefully selected set of species descriptions, illustrations, and keys which will be of great value to each and everyone of us whose main interest is beetles.

But the book will not do for us what you might think a reviewer has in mind when he makes the above sort of statements. Each specialist will pick up the book and moan about the omission of his favorite species. This is to be expected. He will never complain, however, when he goes into the local book store and sees a stock of this book. He will be pleased to see his name listed in the bibliography and happy at last to be able to defend his interest in beetles to the gen-